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STAAS & HALSEY LLP
SUITE 700
1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER

LI, SHI K

ART UNIT	PAPER NUMBER
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2633

DATE MAILED: 01/30/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/776,630

Applicant(s)

SAKAMOTO ET AL.

Examiner

Shi K. Li

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 9 recites the limitation "the transmission error rate" in line 5 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-3 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Terahara (Japan Patent Application Pub. JP 9-261205 with English translation provided by U.S. Patent 6,134,034 to which line numbers are referred in the following rejection) in view of Swanson et al. (U.S. Patent 6,433,904 B1) and Satoh (6,583,910 B1).

Terahara discloses in FIG. 17 a WDM communication system comprising a transmitting terminal station 98, a receiving terminal station 100, SNR monitor 116, reception information

transmission means 118 and control device 124. Terahara teaches in col. 5, lines 30-31 to control pre-emphasis based on the reception information about each wavelength transmitted from the receiving terminal station. Regarding claims 1 and 10, the differences between Terahara and the claimed invention are (a) Terahara does not teach measuring error rate and (b) Terahara does not teach chirp applying means.

Swanson et al. teaches in col. 9 lines 37-40 that BER can be measured by measuring SNR and estimated from the SNR. One of ordinary skill in the art would have been motivated to combine the teaching of Swanson et al. with the WDM communication system of Terahara because accurate direct BER measurement takes a long time for low BER (see col. 9, lines 22-25). Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to measure SNR and estimate BER based on the SNR, as taught by Swanson et al., in the WDM communication system of Terahara because accurate direct BER measurement takes a long time for low BER.

The modified communication system of Terahara and Swanson et al. still fails to teach a chirp applying means. Satoh teaches in FIG. 9 a transmitter 10 in which a chirp parameter α is controllable. One of ordinary skill in the art would have been motivated to combine the teaching of Satoh with the modified communication system of Terahara and Swanson et al. because controlling the chirp parameter can compensate dispersion of optical fiber as explained by Satoh in col. 5, lines 1-64. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a chirp controlling means, as taught by Satoh, in the modified communication system of Terahara and Swanson et al. because controlling the chirp parameter can compensate dispersion of optical fiber.

Regarding claim 2, Terahara teaches in col. 13, lines 21-24 to superimpose reception information on a signal light transmitted in a direction from the receiving terminal station 100 to the transmitting terminal station 98.

Regarding claim 3, Terahara teaches in FIG. 5 multiplexing device 18 for multiplexing optical signals generated by a plurality of laser diodes.

Regarding claims 8 and 9, Swanson et al. teaches in col. 9 lines 37-40 that BER can be measured by measuring optical or electrical SNR and estimated from the SNR.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Terahara, Swanson et al. and Satoh as applied to claims 1-3 and 8-10, above, and further in view of Taga et al. (U.S. Patent 5,790,289).

Terahara, Swanson et al. and Satoh have been discussed above in regard to claims 1-3 and 8-10. The difference between Terahara, Swanson et al. and Satoh and the claimed invention is that Terahara, Swanson et al. and Satoh do not teach to control an optical amplifier. Taga et al. teaches in FIG. 2 to include an optical amplifier in a pre-emphasis control circuit and control the gain of the amplifier from a controller. One of ordinary skill in the art would have been motivated to combine the teaching of Taga et al. with the modified communication system of Terahara, Swanson et al. and Satoh because the SNR at the receiving end of a wavelength can be adjusted by adjusting the gain of an amplifier to achieve a desirable bit-error rate. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the gain of an optical amplifier based on the reception information, as taught by Taga et al., in the modified communication system of Terahara, Swanson et al. and Satoh because the SNR at

the receiving end of a wavelength can be adjusted by adjusting the gain of the amplifier to achieve a desirable bit-error rate.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Terahara, Swanson et al. and Satoh as applied to claims 1-3 and 8-10 above, and further in view of Khaleghi et al. (U.S. Patent 6,040,933).

Terahara, Swanson et al. and Satoh have been discussed above in regard to claims 1-3 and 8-10. The difference between Terahara, Swanson et al. and Satoh and the claimed invention is that Terahara, Swanson et al. and Satoh do not teach an optical add/drop multiplexer (ADM). Khaleghi et al. teaches in FIG. 3 ADM 130 with a transmitter Tx5. ADM allows traffic to be dropped off and added at convenient locations along the transmission path. FIG. 3 suggests to control the power level of Tx5 by adjusting amplifier 20 in the same way power levels of wavelengths are adjusted in a transmitting terminal station. One of ordinary skill in the art would have been motivated to combine the teaching of Khaleghi et al. with the modified communication system of Terahara, Swanson et al. and Satoh because the SNR of the added wavelength at the receiving terminal station depends on the power level of the transmitter at the ADM instead of the power level of the transmitter at the transmitting terminal station due to the dropping and adding of the wavelength channel. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the power level of a transmitter at a ADM, as taught by Khaleghi et al., in the modified communication system of Terahara, Swanson et al. and Satoh because the SNR of the added wavelength at the receiving terminal station depends on the power level of the transmitter at the ADM instead of the power

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level of the transmitter at the transmitting terminal station due to the dropping and adding of the wavelength channel.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Terahara, Swanson et al. and Satoh as applied to claims 1-3 and 8-10 above, and further in view of Eggleton et al.

(U.S. Patent 6,370,300 B1).

Terahara, Swanson et al. and Satoh have been discussed above in regard to claims 1-3 and 8-10. The difference between Terahara, Swanson et al. and Satoh and the claimed invention is that Terahara, Swanson et al. and Satoh do not teach wavelength dispersion compensation at the transmitting terminal station. Eggleton et al. teaches in FIG. 12 to use reception information for controlling a dispersion compensator at a remote (transmitting) station. One of ordinary skill in the art would have been motivated to combine the teaching of Eggleton et al. with the modified communication system of Terahara, Swanson et al. and Satoh because dispersion compensation can improve received signal quality. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the reception information to control a dispersion compensator at the transmitting terminal station, as taught by Eggleton et al., in the modified communication system of Terahara, Swanson et al. and Satoh because dispersion compensation can improve received signal quality.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Terahara, Swanson et al. and Satoh as applied to claims 1-3 and 8-10 above, and further in view of Eggleton et al.

(U.S. Patent 6,370,300 B1) and Bülow (U.S. Patent 6,016,379).

Terahara, Swanson et al. and Satoh have been discussed above in regard to claims 1-3 and 8-10. The difference between Terahara, Swanson et al. and Satoh and the claimed invention

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is that Terahara, Swanson et al. and Satoh do not teach wavelength dispersion compensation and polarization-mode dispersion compensation at the receiving terminal station. Eggleton et al. teaches in FIG. 12 to use reception information for controlling a wavelength (chromatic) dispersion compensator 33 at a receiving terminal station. One of ordinary skill in the art would have been motivated to combine the teaching of Eggleton et al. with the modified communication system of Terahara, Swanson et al. and Satoh because dispersion compensation can improve received signal quality. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the reception information to control a wavelength dispersion compensator at the receiving terminal station, as taught by Eggleton et al., in the modified communication system of Terahara, Swanson et al. and Satoh because dispersion compensation can improve received signal quality.

The modified communication system of Terahara, Swanson et al., Satoh and Eggleton et al. still fails to teach polarization-mode compensation. Bülow teaches in FIG. 1 a receiver with PMD compensation. FIG. 1 comprises a signal monitor 8, control logic 7, delay lines D1-Dn and equalizers E1-En. One of ordinary skill in the art would have been motivated to combine the teaching of Bülow with the modified communication system of Terahara, Swanson et al., Satoh and Eggleton et al. because compensating PMD further improves received signal quality and reduces error. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include PMD compensator in the receiving terminal station, as taught by Bülow, in the modified communication system of Terahara, Swanson et al., Satoh and Eggleton et al. because compensating PMD further improves received signal quality and reduces error.

11. Claims 11-14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Terahara (Japan Patent Application Pub. JP 9-261205 with English translation provided by U.S. Patent 6,134,034 to which line numbers are referred in the following rejection) in view of Swanson et al. (U.S. Patent 6,433,904 B1), Ford et al. (U.S. Patent 6,392,769 B1) and Stephens (U.S. Patent 6,236,487 B1).

Terahara discloses in FIG. 17 a WDM communication system comprising a transmitting terminal station 98, a receiving terminal station 100, SNR monitor 116, reception information transmission means 118, control device 124 and a plurality of repeaters 104. Terahara teaches in col. 5, lines 30-31 to control the pre-emphasis based on the reception information about each wavelength transmitted from the receiving terminal station. Regarding claims 11 and 16, the differences between Terahara and the claimed invention are (a) Terahara does not teach measuring error rate, (b) Terahara does not teach a reception information transfer means for sending control information to repeaters and (c) Terahara does not teach to use Raman amplifiers in the repeaters.

Swanson et al. teaches in col. 9 lines 37-40 that BER can be measured by measuring SNR and estimated from the SNR. One of ordinary skill in the art would have been motivated to combine the teaching of Swanson et al. with the WDM communication system of Terahara because accurate direct BER measurement takes a long time for low BER (see col. 9, lines 22-25). Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to measure SNR and estimate BER based on the SNR, as taught by Swanson et al., in the WDM communication system of Terahara because accurate direct BER measurement takes a long time for low BER.

The modified communication system of Terahara and Swanson et al. fails to teach sending control information to the repeaters from the transmitting terminal station. Ford et al. discloses in FIG. 1 a WDM control system comprising three repeaters 103, 104 and 105. Ford et al. teaches to use λ_c to send control information to the repeaters as illustrated in FIG. 3. One of ordinary skill in the art would have been motivated to combine the teaching of Ford et al. with the modified communication system of Terahara and Swanson et al. because wavelength power level may have attenuated unequally by the transmission fiber and need correction. Based on information such as power level at transmitting station and measured power level at the repeater, a controller can control gain of amplifier in the repeater to make accurate correction. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to send control information from the transmitting terminal station to the repeaters, as taught by Ford et al., in the modified communication system of Terahara and Swanson et al. because wavelength power level may have attenuated unequally by the transmission fiber and need correction.

The modified communication system of Terahara, Swanson et al. and Ford et al. still fails to teach Raman amplifiers in the repeaters. Stephens teaches in FIG. 2 a WDM channel power control arrangement where signal varying devices (repeaters) 16 are controlled by reception information. Stephens suggests in col. 6, line 3 to use Raman and erbium amplifiers for the gain adjusting devices. One of ordinary skill in the art would have been motivated to combine the teaching of Stephens with the modified communication system of Terahara, Swanson et al. and Ford et al. because Raman amplifiers can operate over a wide wavelength range. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Raman amplifiers in the repeaters and adjust channel power based on reception information, as

taught by Stephens, in the modified communication system of Terahara, Swanson et al. and Ford et al. because Raman amplifiers can operate over a wide wavelength range.

Regarding claim 12, Stephens suggests in col. 6, line 7 to use erbium (a rare earth element) fiber.

Regarding claim 13, Terahara teaches in col. 13, lines 21-24 to superimpose reception information on a signal light transmitted in a direction from the receiving terminal station 100 to the transmitting terminal station 98.

Regarding claim 14, Stephens suggests in FIG. 3 to transmit reception information from the reception terminal station.

Regarding claim 15, Ford et al. teaches in col. 3, lines 36-39 that only node 105 provides equalization while the other nodes do not provide equalization.

12. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Terahara (Japan Patent Application Pub. JP 9-261205 with English translation provided by U.S. Patent 6,134,034 to which line numbers are referred in the following rejection) in view of Swanson et al. (U.S. Patent 6,433,904 B1), Satoh (6,583,910 B1) and Stephens (U.S. Patent 6,236,487 B1).

Terahara discloses in FIG. 17 a WDM communication system comprising a transmitting terminal station 98, a receiving terminal station 100, SNR monitor 116, reception information transmission means 118, control device 124 and a plurality of repeaters 104. Terahara teaches in col. 5, lines 30-31 to control the pre-emphasis based on the reception information about each wavelength transmitted from the receiving terminal station. Regarding claims 11 and 16, the differences between Terahara and the claimed invention are (a) Terahara does not teach

measuring error rate, (b) Terahara does not teach chirp applying means and (c) Terahara does not teach to use Raman amplifiers in the repeaters.

Swanson et al. teaches in col. 9 lines 37-40 that BER can be measured by measuring SNR and estimated from the SNR. One of ordinary skill in the art would have been motivated to combine the teaching of Swanson et al. with the WDM communication system of Terahara because accurate direct BER measurement takes a long time for low BER (see col. 9, lines 22-25). Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to measure SNR and estimate BER based on the SNR, as taught by Swanson et al., in the WDM communication system of Terahara because accurate direct BER measurement takes a long time for low BER.

The modified communication system of Terahara and Swanson et al. fails to teach a chirp applying means. Satoh teaches in FIG. 9 a transmitter 10 in which a chirp parameter α is controllable. One of ordinary skill in the art would have been motivated to combine the teaching of Satoh with the modified communication system of Terahara and Swanson et al. because controlling the chirp parameter can compensating dispersion of optical fiber as explained by Satoh in col. 5, lines 1-64. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a chirp controlling means, as taught by Satoh, in the modified communication system of Terahara and Swanson et al. because controlling the chirp parameter can compensating dispersion of optical fiber.

The modified communication system of Terahara, Swanson et al. and Satoh still fails to teach Raman amplifiers in the repeaters. Stephens teaches in FIG. 2 a WDM channel power control arrangement where signal varying devices (repeaters) 16 are controlled by reception

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information. Stephens suggests in col. 6, line 3 to use Raman and erbium amplifiers for the gain adjusting devices. One of ordinary skill in the art would have been motivated to combine the teaching of Stephens with the modified communication system of Terahara, Swanson et al. and Satoh because Raman amplifiers can operate over a wide wavelength range. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Raman amplifiers in the repeaters and adjust channel power based on reception information, as taught by Stephens, in the modified communication system of Terahara, Swanson et al. and Satoh because Raman amplifiers can operate over a wide wavelength range.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 703 305-4341. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 703 305-4729. The fax phone number for the organization where this application or proceeding is assigned is 703 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 305-3900.

skl

Leslie Pascal
LESLIE PASCAL
PRIMARY EXAMINER